

EFFECTIVENESS OF MATHEMATICS LEARNING USING PROBING MODEL - PROMPTING LEARNING ON STUDENT ABILITY ABOUT CRITICAL THINKING STUDY ABOUT CLASS VIII SMP N 1 SEDAYU BANTUL DISTRICT

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ABSTRACT

The research is conducted because the learning process only centered by the teacher so that the student's ability is still not enough. The research aims to know the differences in the student's ability for critical thinking. The learning process use probing – prompting learning model and live learning model then compare the effectiveness both of the model towards the student's ability of critical thinking. The population of this research is VIII B, VIII D, and VIII F SMP N 1 Sedayu because the classes have the same ability. The sample was taken by a random sampling technique then VIII B was selected as the experiment class and VIII D as a control class. The design of the research is a posttest only control design. The technique of resource data use test. The instrument of resource data is problem description (posttest). The instrument test of resource data use validity test and reliability test. The technique of data analysis is a normal test, homogeny test, then hypothesis test with the first hypothesis test and second hypothesis test. The result of the hypothesis test with significant level 5% and $dk = 60$ show that : (1) $T_0 = 2,1764$ dan $T_{(0,025)}(60) = 1,960$ sehingga $T_0 > T_{(0,025)}(60)$, so there are differences in the student's ability of critical thinking that use probing – prompting learning model and live learning model. (2) $T_0 = 2,1764$ dan $T_{(0,05)}(60) = 1,6706$ sehingga $T_0 > T_{(0,05)}(60)$, so the student's ability of critical thinking that uses probing – prompting learning model is more effective then use a live learning model.

Keywords: *Effectiveness, Probing – Prompting Learning Model, Critical Thinking.*

INTRODUCTION

The development and changes that occur in social life in Indonesia are inseparable from the development of science and technology. Mathematics plays an important role in advancing knowledge and technology because almost all science and technology requires mathematics. Mathematics is one of the subjects taught at the level of basic education to higher education. Mathematics learning in schools teaches and trains students to think logically, rationally and critically so that they are able to understand concepts and solve problems. To meet the demands of the 21st century, students must know more than just core subjects. They need to know how to use their knowledge and skills by thinking critically applying knowledge to new situations, analyzing information, understanding new ideas, communicating, collaborating, solving problems, and making decisions.

The ability to think critically not only emphasizes students on the ability to solve problems, but also the ability of students to evaluate problems and solve problems. Students are able to evaluate the truth in solving these problems. From the description above it can be seen that the ability to think critically is an important part needed by students. The ability of students to think is also supported by using appropriate learning models. The right learning model can improve students' ability to think critically in analyzing problems, solving problems and drawing conclusions.

Based on interviews conducted with a number of VII grade students of SMP N 1 Sedayu on May 16, 2016, they said that mathematics was not interesting and boring. That is because mathematics is a difficult subject and many formulas must be memorized. Based on observations of the learning process carried out on May 16, 2016, in class VII SMP N 1 Sedayu, it was found that when the mathematics learning process was still using the teacher-centered learning method. Students only listen to the explanation from the teacher and pay attention to important points of the material delivered by the teacher. This makes students less active role in learning. Huda, Miftahul (2014: 281) argues that probing - prompting learning is learning by presenting a series of questions that are guiding and exploring

students' ideas so that they can jump-start thinking processes that are able to link students' knowledge and experience with knowledge being learned. Based on interviews with Ms. Budi Setyowati, S.Pd on May 16, 2016, it was found that students' mathematics learning outcomes are still low. The low learning outcomes can be seen from the average grade of the Class Increase Test in the 2015/2016 school year. A summary of the average grades of UKK VII for the even semester of the 2015/2016 school year can be seen in Table 1.

Table 1. Average and Completion of Students in UKK Mathematics Class VII SMP N 1 Sedayu 2015/2016

Class	Average	KKM	Total Students	
			Complete	Not complete
VII A	68,47	75	14	28
VII B	61,25	75	10	22
VII C	65,33	75	12	18
VII D	59,50	75	5	25
VII E	51,72	75	1	31
VII F	59,67	75	8	22
VII G	67,34	75	12	20

From Table 1 it can be seen that all students have not yet reached the Minimum Mastery Criteria (KKM). According to Ms. Budi Setyowati, S. Pd, this was caused by several factors, namely, mathematics was considered difficult, lack of interest in the subject matter presented, and the concentration of students was lacking when attending the lesson. In addition, students are still fixated on formulas, lack of understanding of questions on questions in the form of stories, and skills in solving, evaluating, and drawing conclusions in solving problems are also lacking. So that critical thinking skills are also lacking.

Based on the background of the problem that has been described above, the formulation of the problem from this research is:

1. Is there a difference in the ability of students to think critically in learning mathematics by using the model of probing - prompting learning and direct learning models of class VIII students of SMP N 1 Sedayu, Bantul Regency, Academic Year 2016/2017?
2. Is mathematics learning using the probing - prompting learning model of the ability of students to think critically in class VIII SMP N 1 Sedayu in Bantul Regency 2016/2017 Academic Year probing - prompting learning is more effective than the direct learning model?

Based on the background and problem formulation, the objectives of this study are:

1. Knowing the differences in the ability of students to think critically in mathematics learning by using the probing - prompting learning model and direct learning models of class VIII SMP N 1 Sedayu, Bantul, 2016/2017 Academic Year.
2. Knowing a more effective learning model between mathematics learning by using the probing - prompting learning model and direct learning models to the ability of students to think critically grade VIII students of SMP N 1 Sedayu, Bantul Regency Academic Year 206/2017.

METHODS

This type of research in this study is an experimental study using comparative research. In this case, the application of Probing Prompting Learning is then controlled and seen as having an effect on the ability of students to think critically. The research design used in this study is Posttest-Only Control Design. The research design is described as in Table 2 below:

Table 2. Research Design

Class	Treatment	Posttest
Experiment	X	O ₁
conventional	-	O ₂

Information :

X : Learning with cooperative methods of type probing - prompting

O₁ : Posttest results after being treated X

O₂ : Posttest results without X treatment

The research was conducted at SMP N 1 Sedayu at the beginning of the odd semester of the 2016/2017 school year.

According to Arikunto, Suharsimi (2013: 173) "Population is the whole subject of research." While Sugiyono (2014: 80) "Population is a general area which consists of objects/subjects that have certain qualities and characteristics determined by researchers to be studied and then drawn conclusions."

In this study were students of class VIII SMP N 1 Sedayu odd semester 2016/2017 academic year which included 7 classes with a total of 217 students. With the following details: class VIII A consists of 31 students, class VIII B consists of 32 students, class VIII C consists of 30 students, and class VIII D consists of 30 students, class VIII E 32 students, class VIII F 30 students, and class VIIG 32 students. The population drawn from 7 classes are 3 classes, class VIII B, VIII D, and VIII F because these three classes have certain characteristics and qualities, namely almost the same ability. The situation can be seen from the average grade VII of UKK even semester 2015/2016 academic year. The results of random sampling obtained class VIII B as an experimental class with probing prompting learning treatment and class VIII D as a control class with direct learning treatment.

The research variable is an attribute or nature or value of people, objects or activities that have certain variations determined by researchers to be studied and then drawn conclusions (Sugiyono, 2014: 38). The variables in this study were the probing - prompting learning model and the critical thinking skills of students of class VIII odd semester of SMP N 1 Sedayu in the 2016/2017 Academic Year.

Data collection techniques in this study using the test method with data collection instruments in the form of test item description that aims to determine differences in students' critical thinking skills. In addition to the test method, in this study using the observation method with an instrument in the form of an observation sheet that aims to determine the feasibility of learning.

The test used is the analysis prerequisite test with the Chi-squared formula normality test and the homogeneity test of the F-test formula. Test the research hypothesis using the t-test. T-test was conducted to determine whether there are differences in critical thinking skills and which model is more effective in improving students' ability to think critically.

RESULTS AND DISCUSSION

Based on the research that has been carried out obtained data in the form of initial abilities and student learning outcomes. The initial ability score was obtained from the results of the pretest grades of class VIII A and VIII G from the results of tests conducted by mathematics teachers in class VIII SMP N 2 Pleret. A summary of the initial mathematical ability scores for the experimental class and the control class can be seen in Table 3.

Table 3. Summary Descriptions of Initial Ability Values

Class	Experiment (VIII B)	Control (VIII D)
The highest score	27,5	31,5
Lowest Value	95,5	90
Average	61,25	59,50
S	19,2364	14,7542
S ²	370,039	217,686
Lots of data	32	30

Source: SMP N 1 Sedayu

The normality test is used to find out whether or not the normal distribution of the initial ability of each experimental class and dick data. Researchers performed 2 times the normality test calculation,

namely the normality test for the experimental class and for the control class. The summary of the results of the initial ability normality test can be seen in Table 4.

Table 4. Summary of Initial Ability Normality Test Results

Variable	Experiment (VIII B)	Control (VIII D)
χ^2	2,9290	0,5516
(α)	7,8150	7,8150
Dk (k-1)	5%	5%
χ^2_{table}	3	3
Testing criteria	Samples are normally distributed if $\chi^2_{count} < \chi^2_{table}$	
Information	Normal	Normal

From the normality test, the significance level is 5% and the degree of freedom = 3, it can be seen that $\chi^2_{count} = 2,929$ and $\chi^2_{table} = 7.815$ so that $\chi^2_{count} < \chi^2_{table}$, which means that the initial ability scores of the experimental class students were normally distributed. In the control class of 5% significance level and degree of freedom = 3, it can be seen that $\chi^2_{count} = 0.5516$ and $\chi^2_{table} = 7.8150$, which means that the initial ability value of control class students is normally distributed.

The homogeneity test on learning outcome data is intended to investigate whether all samples in the population have the same variance or not. Researchers performed homogeneity test calculations 2 times, namely the homogeneity test for the experimental class and for the control class. The summary of the results of the initial ability normality test can be seen in Table 5.

Table 5. Summary of Initial Ability Homogeneity Test Results

Parameter	Initial Value
$F_{0,975}(29,31)$	0,4798
F_0	1,6999
$F_{0,025}(31,29)$	2,0841
Testing criteria	Samples are normally distributed if $F_{0,975} < F_0 < F_{0,025}$
Information	Homogeneous

From the table above $F_{0,975} < F_0 < F_{0,025}$ so 2 data samples are homogeneous.

The summary of the initial ability similarity hypothesis test scores can be seen in Table 6.

Table 6. Summary of Hypothesis Test Results

Instrument	T_0	$T_{\frac{\alpha}{2}}(n_1 + n_2)$	Information
Initial Value	0,3965	2,0003	H_0 received

From Table 5 it can be concluded:

$T_0 = 0,3965$ and $T_{(0,025)}(60) = 2,0003$ so that $T_0 < T_{(0,025)}(60)$ then H_0 is accepted.

The conclusion is that there is no significant difference in the mathematics learning outcomes of the experimental class and control class students.

The value of student learning outcomes obtained from the results of the posttest grades VIII B and VIII D from the results of the study and using the questions that can be used to determine student learning outcomes, the questions consist of 18 questions. Summary of the description of the mathematics learning outcomes of the experimental class and the control class can be seen in Table 7.

Table 7. Summary Description of Data on Mathematics Test Results

Class	Experiment (VIII B)	Control (VIII D)
The highest score	46,67	33,33
Lowest Value	96,67	100
Average	78,12	70,11
S	173,7912	248,168
S^2	13,183	15,7534
Lots of data	32	30

Source: SMP N 1 Sedayu

The normality test is used to find out whether or not the normal distribution of the initial ability of each experimental class and dick data. Researchers performed 2 times the normality test calculation, namely the normality test for the experimental class and for the control class. The summary of the results of the initial ability normality test can be seen in Table 8.

Table 8. Summary of Test Results for Mathematics Normality Test

Variable	Experiment (VIII B)	Control (VIII D)
χ^2	2,7989	0,5269
(α)	7,815	7,815
Dk (k-1)	5%	5%
χ^2_{table}	3	3
Testing criteria	Samples are normally distributed if $\chi^2_{count} < \chi^2_{table}$	
Information	Normal	Normal

From the normality test, the significance level is 5% and the degree of freedom = 3, it can be seen that $\chi^2_{count} = 2,7989$ and $\chi^2_{table} = 7.815$ so that $\chi^2_{count} < \chi^2_{table}$, which means the scores of the experimental students' mathematics test results are normally distributed. In the control class of 5% significance level and degree of freedom = 3, it can be seen that $\chi^2_{count} = 0,5269$ and $\chi^2_{table} = 7.815$, which means the value of the mathematics test results of control class students is normally distributed.

Uji homogenitas pada data hasil belajar ini dimaksudkan untuk menyelidiki apakah semua sampel pada populasi mempunyai variansi yang sama atau tidak. Peneliti melakukan perhitungan uji homogenitas sebanyak 2 kali yaitu uji homogenitas untuk kelas eksperimen dan untuk kelas kontrol. Adapun rangkuman hasil uji normalitas kemampuan awal dapat dilihat pada Tabel 9.

Tabel 9. Rangkuman Hasil Uji Homogenitas Tes Matematika

Parameter	Posttest
$F_{0,975}(29,31)$	0,4798
F_0	0,7003
$F_{0,025}(31,29)$	2,0841
Testing criteria	Homogeneous sample if $F_{0,975} < F_0 < F_{0,025}$

From the table above you can see $F_{0,975} < F_0 < F_{0,025}$ s so that both data are homogeneous.

The summary of the first hypothesis test value can be seen in Table 10.

Table 10. Summary of the First Hypothesis Test Results

Instrument	T_0	$T_{\frac{\alpha}{2}(n_1 + n_2)}$	Information
Posttest	2,1764	2,0003	H_0 rejected

From Table 10 it can be concluded:

$T_0 = 2,1764$ and $T_{(0,025)}(60) = 2,0003$ so that $T_0 < T_{(0,025)}(60)$ then H_0 received.

The conclusion is that there are differences in the ability of students to think critically in class VIII SMP N 1 Sedayu, Bantul in the 2016/2017 school year.

The summary of the first hypothesis test value can be seen in Table 11 From Table 11 it can be concluded:

Table 11. Summary of Second Hypothesis on Mathematics Test Results

Instrument	T_0	$T_\alpha(n_1 + n_2 - 2)$	Information
<i>Posttest</i>	2,1764	1,6706	H_0 rejected

$T_0 = 2,1764$ and $T_{(0,025)}(60) = 1,6706$ so that $T_0 < T_{(0,025)}(60)$ then H_0 received. In conclusion, the ability of students to think critically is more effective using the probing - prompting learning model.

CONCLUSION

Based on the results of the study, the following conclusions can be drawn:

1. There is a significant difference in the ability of students to think critically using the model of probing - prompting learning and direct learning models in class VIII SMP N 1 Sedayu, Bantul in the 2016/2017 school year
2. The ability of students to think critically using the model of probing - prompting learning is more effective than the direct learning model of students in class VIII SMP N 1 Sedayu, Bantul in the 2016/2017 school year.

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